Journal of Orthopedics Research and Rehabilitation

Review

DOI: 10.51271/JORR-0025

Total knee arthroplasty and rehabilitation

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Received: 19/01/2024 ◆ **Accepted**: 27/01/2024 ◆ **Published**: 29/01/2024

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ABSTRACT

Arthroplasty is the reconstruction of the joint to relieve pain, increase range of motion and provide stabilization in any joint. The main goals of total knee arthroplasty are to relieve pain, improve function, improve quality of life, create a long-lasting artificial joint, and prevent or reduce surgical complications. Joint infection, sepsis or systemic infections, neuropathic arthropathy, painful stiff knee fusion due to complex regional pain syndrome (CRPS), genu recurvatum due to neuromuscular weakness, painless and well-functioning knee arthrodesis are absolute contraindications to total knee arthroplasty. In addition, the patient should be monitored for circulation, sensation and infections during the acute period (1-5 days). An appropriate DVT prophylaxis should be given. There is evidence that long-term physical deficiencies persist after arthroplasty. Since decreased muscle strength, decreased flexibility, abnormalities in walking, and deficits in postural stability can be detected, it is recommended to continue exercise programs for at least 1 year.

Keywords: Arthroplasty, joint pain, knee, relieve pain

INTRODUCTION

Arthroplasty is the reconstruction of the joint to relieve pain, increase range of motion and provide stabilization in any joint. The main goals of total knee arthroplasty (TKA) are to relieve pain, improve function, improve quality of life, create a long-lasting artificial joint, and prevent or reduce surgical complications. The main indications for arthroplasty are knee pain with functional deterioration, inadequate activities of daily living (ADL), radiographic evidence of significant arthritic involvement, failure of conservative treatment, inflammatory arthritis, sequelae of previous pyogenic arthritis or osteomyelitis, avascular necrosis, tumors, congenital deformities.[1]

TOTAL KNEE ARTHROPLASTY REHABILITATION GOALS[1-3]

- To prevent complications such as deep vein thrombosis (DVT), pulmonary embolism, pressure sores that may develop due to bed rest
- Ensuring adequate and functional range of motion (ROM)
- Trying to reduce post operative pain
- Strengthen the muscles around the knee
- Ensuring independence in ambulation and IYA
- Improving the quality of life can be counted among our main goals.

Joint infection, sepsis or systemic infections, neuropathic arthropathy, painful stiff knee fusion due to complex regional pain syndrome (CRPS), genu recurvatum due to neuromuscular weakness, painless and well-functioning knee arthrodesis are absolute contraindications to total knee arthroplasty. Relative contraindications include severe osteoporosis, poor health status, dysfunctional extensor mechanism, painless and stable arthrodesis, significant peripheral vascular disease, patients who cannot comply with rehabilitation, body mass index over 50, recurrent urinary infections.[3]

TKA can be classified according to the compartment in which the prosthesis is applied, the mechanical support it provides and the type of fixation. According to the compartment in which the prosthesis is applied

1. Unicompartmental knee prostheses
2. Bicompartmental knee prostheses
3. It can be classified as tricompartmental knee prosthesis.

According to the mechanical support it provides

1. Constrained
2. Semi constrained
3. It can be evaluated as unconstrained.

According to fixation types;

1. Cemented
2. Cementless
3. Hybrid.[4]

With the development of new implant designs and surgical techniques, the long-term survival rates of cementless total knee arthroplasty (TKA) have become equal to those of cemented TKA, with excellent results

Cite this article: Kültür T, Özkan A. Total knee arthroplasty and rehabilitation. *J Orthop Res Rehabil.* 2024;2(1):15-18

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reported in many studies. Studies on cemented TKA have shown that the outcomes of young and obese patients are worse than those of older and thinner patients. In addition, with cementless TKA, similar results have been obtained in young and obese patients to those in older and thinner patients. In this case, cementless TKA emerges as a more suitable option for young and obese patients.[4-6]

Rehabilitation in total knee arthroplasty is handled in 3 stages: preoperative, post operative, late post operative rehabilitation. Preoperative rehabilitation goals and objectives include starting aerobic exercises, patient education, pain management, teaching acute post operative exercises, and informing the patient about possible complications.[6]

For post operative rehabilitation, the first point to be mentioned is that despite all the developments in total joint arthroplasty, there is no standard post operative treatment protocol after TKA. The important point in rehabilitation planning is the type of prosthesis. In cemented prostheses, load bearing with a walker may be allowed as tolerated from the first postoperative day. In uncemented and hybrid prostheses, full load bearing is usually started after the 6th week. It has been proven that early mobilization has an important place in the rehabilitation program when appropriate conditions are provided.[7]

POST OPERATIVE ACUTE REHABILITATION

Pain assessment with visual analog scale (VAS) before and after treatment, rest, cold application, compression, elevation, continuous passive motion (CPM) device is used. With the CPM device, it is aimed to increase knee flexion up to 40 degrees on the 4th day, then increase by 10 degrees every day according to the patient's tolerance and reach 90 degrees of flexion at the end of the 1st week. Each cycle of the CPM device should be completed in one minute. Although it is accepted that the CPM device has no significant negative effect on wound healing, a few studies have suggested that flexion angles above 40 degrees in the first days of surgery impair tissue oxygenation. It is accepted that the CPM device does not reduce the incidence of deep vein thrombosis. It should be known that the CPM device does not reduce the use of analgesics and hospitalization time and has no effect on quadriceps strength. Despite such effects, the use of the CPM device has become widespread due to its advantages such as the patient feeling less pain compared to manual passive exercises during rehabilitation, not occupying the therapist, being theoretically applicable for 24 hours although it is not suitable for use for more than 4-6 hours, and good patient compliance.[8]

In addition, the patient should be monitored for circulation, sensation and infections during the acute period (1-5 days). An appropriate DVT prophylaxis should be given. TENS (Transcutenous Electrical Nerve Stimulation), NMES (Neuromuscular Electrical Stimulation) can be applied.[9]

Careful wound care should be practiced. Bedside exercises should be practiced. Most studies indicate that these exercises should be started immediately 2-4 hours postop. Ankle pumping exercises and quadriceps isometric exercises are beneficial. If there is no extension limitation, straight leg raising can be started. At the same time, isometric hip extension exercises, heel shifting exercises according to the patient's tolerance, terminal knee extension with the help of a pillow or a small support, patellar mobilization (when the incision site stabilizes) can be applied, and all these exercises are considered among the acute period goals.[2,8-10]

Post-operative Weeks 1-4

Achieving full extension, normalization of walking and focusing on increasing the flexion angle are among the most important goals of this period. Again in this period, gradually increasing the flexion angle from 90 degrees to 120 degrees and transition to independent functions in daily life activities are among the goals. It is very important to review the walking aids and make them safe for the patient. The importance of applying stretching exercises to the hamstring, gastrocnemius-soleus, iliotibial band, tensor fascia lata and lower extremity muscles in general has been stated in many studies. Balance exercises, increasing walking distance and improving walking tolerance, quadriceps sets, straight leg raises, gluteal sets, active assistive, active ROM exercises in sitting or supine position, horizontal cycling, bedside exercises with assisted or friction-reduced heel sliding exercises, terminal knee extension exercises with teraband, strengthening of gluteus medius and external rotator muscles, hip and knee circumference isometric exercises can be shown among other objectives in this period.[7,8,10-12]

Post-operative Weeks 4-12

Restoration of gait is among the main goals. Unilateral treadmill can be used with intact leg and bilateral upper extremity support. Closed kinetic chain exercises, parallel bar training, and ROM and strengthening exercises according to the patient's tolerance can be progressed according to the patient's clinic and response to treatment. There is evidence that NMES with quadriceps sets/straight leg raises is beneficial. Terminal knee extension, progressive hip abduction/adduction strengthening exercises can be applied. The patient should be ambulated on smooth surfaces and stairs with the least restrictive device or independently.[1-3,7-11]

9-12 Weeks and Above

Exercise progression and discharge plan are decided according to the patient's condition.

Recommendations for exercise and sports activities after total knee arthroplasty: After hip and knee arthroplasty, low and moderate intensity activities that do not overload the joint are allowed. Sports with high compressive and rotator loading on the joint and high risk of injury are not allowed.

- Activities such as swimming, walking, dancing, dancing, cycling, horseback riding, bowling, aquatic aerobic exercises, fitness, yoga, Thai-chi are recommended.
- Skiing, running/jogging, rowing, tennis and golf are recommended with limitations.
- Sports such as football, basketball, volleyball, handball, speed skating, figure skating, ice hockey, rock climbing are not allowed.[1-10]

There is evidence that long-term physical deficiencies persist after arthroplasty. Since decreased muscle strength, decreased flexibility, abnormalities in walking, and deficits in postural stability can be detected, it is recommended to continue exercise programs for at least 1 year.[11]

COMPLICATIONS OF TOTAL KNEE ARTHROPLASTY IN THE EARLY POSTOPERATIVE PERIOD[12-14]

Mortality (0.2-0.7% in the first 90 days after surgery)

- Thromboembolic event
- Neurovascular damage
- Infection
- Arterial injury (0.03-0.2%. But there is a risk of amputation in 25% of cases after injury.
- Peroneal nerve injury (with correction of severe valgus deformity)
- Patellofemoral problems (PF instability, component loosening, fracture, extensor mechanism rupture, patellar clunk syndrome)
- Periprostatic fractures*
- Patellar insitability*
- Aseptic relaxation*

*(Revision surgery is required in such complications)

- Flexion contracture
- Flexion limitation
- Pain and swelling, including

Patellar complications are quite common, accounting for approximately 10% of TKA-related complications. Despite advances in implant design and surgical techniques, these complications can still occur. If the underlying mechanisms of these complications are not well-defined, they can lead to repeated surgeries that do not achieve the desired outcome.[15]

Total knee arthroplasty (TKA) is a surgery to replace a damaged knee joint with an artificial joint. In about 1-12% of patients who undergo TKA, extensor mechanism problems can occur. Quadriceps tendon rupture is reported to occur in 0.1%, while patellar tendon rupture is reported to occur in 0.17%. Traditionally, tendon repair was the preferred treatment for these injuries. However, due to the high failure rates of this method, reconstruction has become the preferred treatment in recent years.[16-17]

The goal of total knee arthroplasty (TKA) is to restore the balance and range of motion of the knee joint and relieve pain. As the average life expectancy increases and the elderly population grows, the need for joint prostheses increases. However, weaknesses in muscles and ligaments in the elderly, prolonged immobilization due to additional diseases, and circulatory disorders can reduce the success of TKA. Multidisciplinary work is important for patients who have undergone TKA to return to their daily activities as soon as possible and to achieve a pain-free life. The analgesia applied after TKA is usually multimodal, including patient-controlled analgesia, peripheral nerve block, epidural analgesia, intra-articular or intra-synovial opioids or local anesthetics, and oral analgesics. Multimodal analgesia is provided by the use of analgesic agents that act on different parts of the pain pathway.[18-19]

Long-term pain following total knee arthroplasty (TKA) and the inability to relieve pain can disrupt rehabilitation. As a result, arthrofibrosis can occur. Increasing range of motion after TKA is very important not only for functional improvement but also for pain reduction. Studies have shown that some patients have concerns such as movement phobia (kinesiophobia), damage to the prosthesis, and increased pain. Movement phobia can be reduced with preoperative activity perception training.[20]

CONCLUSION

Arthroplasty is the reconstruction of the joint to relieve pain, increase range of motion and provide stabilization in any joint. The sooner you start, the more beneficial it will be. Therefore, patients need to continue this process with physical therapy and physiotherapy.

ETHICAL DECLARATIONS

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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